

Two new species of Typhlocybinae (Hemiptera: Cicadellidae) from South Africa, and a redescription of two of Cogan's species

by

B. M. GERARD

51, Caiystane Terrace, Edinburgh, EH10 6SU, Scotland

Introduced by J. G. Theron

Two new species (*Zygina viridis* and *Kybos theroni*) are described, the male of *Zygina elegia* (Cogan), previously known only from the females, is described, and a male of *Zygina purpureatincta* (Cogan), previously described as a female, is redescribed and designated as lectotype; the last two species have been transferred from the genus *Erythroneura*.

Twenty three species of Typhlocybinae are known from South Africa. Cogan (1916) described five species, *Typhlocyba purpureatincta*, *T. elegia*, *T. mallyi*, *Empoasca protea* and *E. heliophila*; Naudé (1926) transferred Cogan's *Typhlocyba* species to *Erythroneura*, included *Empoasca fascialis* (Jacobi) as a South African species (renamed *E. naudei* by Metcalf (1968)), and described eight species of *Erythroneura* and seven of *Empoasca*. *Empoasca dolichi* Paoli and *E. distinguenda* Paoli have been recorded from the Transvaal (Paoli, 1932).

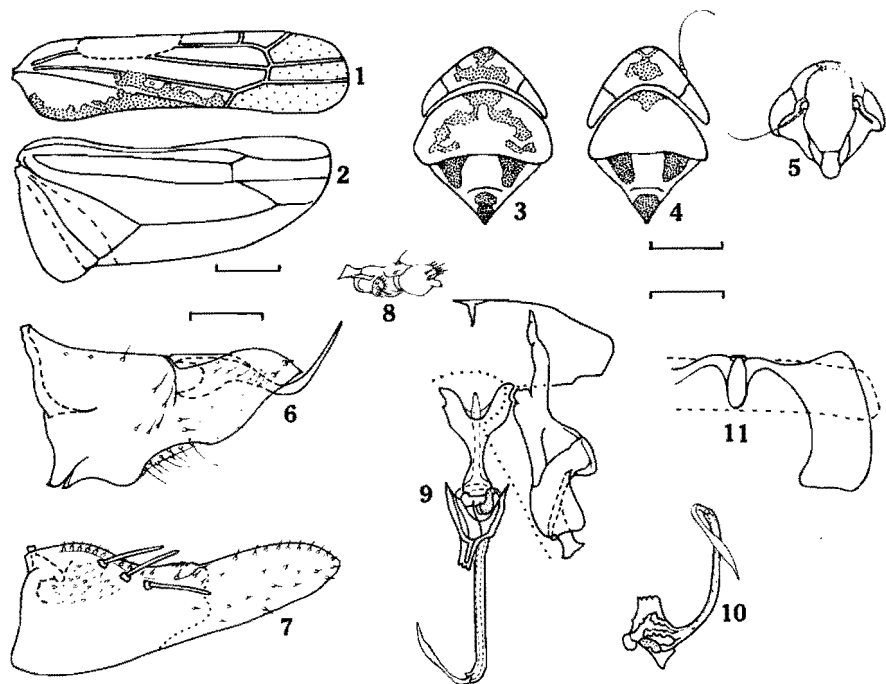
While in Cape Town on May 7 and 8, 1968, I collected three species of Typhlocybinae. These have been compared with Cogan's type material, but only with Naudé's descriptions because the latter's type material is not deposited in a museum and is not accessible for study. One species has been identified as *Erythroneura elegia* (Cogan) and is redescribed here, and two species are described as new. Cogan's type material includes *E. purpureatincta* (Cogan), which was originally identified as a female but is a male; it is redescribed here. This species was described from two specimens and a holotype was not designated; the sole remaining type specimen is designated here as the lectotype.

All of these species differ from the present definitions of typhlocybid genera, but the description of new genera has been deferred until the genitalia of other typhlocybrids from southern Africa have been described; characters of specific and generic importance can then be separated.

All measurements are given in mm, those for females in parenthesis.

Zygina elegia (Cogan, 1916) **comb. nov.**, figs 1-11

Colour. General body colour creamy yellow, with irregular orange-red or fuscous patches on fore wings, vertex and pronotum and dark brown areas on scutellum, as figured.



Figs 1-11. *Zygina elegia* (Cogan). 1-5. Females. 1. Fore wing. 2. Hind wing. 3. Head, pronotum and scutellum, dorsal view (strongly pigmented, slightly squashed specimen). 4. Same (weakly pigmented specimen). 5. Face. 6-11. Male. 6. Pygofer lobe, left lateral view. 7. Subgenital plate, ventrolateral view. 8. Anal tube, left lateral view. 9. Connective, aedeagus and style, dorsal view. 10. Aedeagus, left lateral view. 11. Abdominal apodeme, dorsal view. Scale lines under 1-2 and 3-5 represent 0,5 mm; those over 6-7 and 8-11, 0,1 mm.

Size. Head: width including eyes, 0,82 (0,81); vertex; length, 0,28 (0,28), width at base, 0,44 (0,45). Thorax: pronotum; length, 0,41 (0,44), maximum width, 0,84 (0,84); scutellum; length, 0,40 (0,36-0,45), width at base, 0,61 (0,60). Length of fore wing, 2,68 (2,52-2,76); length of hind wing, 2,52 (2,51). Length of body (head to tip of folded wings), 3,52 (3,55-3,69).

Structure. Head strongly produced, with apex acutely angled in dorsal aspect, medial length of vertex approximately 2 times length next eyes, acutely angled to face, with latter slightly longer than wide. Ocellular area $1\frac{1}{4}$ times width of antennal fossa; ocelli lacking; antenna of medium length.

Apodemes of second abdominal sternite of male robust, widely separated distally, united medially in anterior part of sternite III.

Male genitalia: pygofer lobe tapering posteriorly; incurved ventral margin with row of long setae, lateral wall with fine setae and microsetae scattered over medial and discal areas; long slender appendage arising internally from mid-dorsal margin, curving dorsally, then posterolaterally and exceeding posterior margin. Subgenital

plate long, narrowly triangular, with lateral borders incurved; basal half with row of microsetae and 3 long macrosetae on dorsal margin, and cluster of microspines basally; distal half with scattered microsetae. Style short, with preapical lobe large; apical extension short, broadening to symmetrical apex. Connective Y-shaped, stem of Y approximately equal in length to the arms; the arms broad and flattened. Aedeagus with preatrium long, slender, curving dorsally; bearing ventrally a pair of short triangular processes and dorsally a median quadrangular process; shaft arising from tip of preatrium, bending posteroventrally and to left.

MATERIAL EXAMINED. One of 3 ♀-syntypes, "*Typhlocyba elegia*. Type. Capetown, C.G.H., 1.iii.1900", in collection of the South African Museum. Also, 4 ♂ 6 ♀, South Africa, Cape Peninsula, Simonstown, Red Hill, 7.v.1968, on leaves of *Rhus* sp., possibly *R. lucida* L.: 2 ♂ 2 ♀ dep. in the South African Museum, Cape Town, remainder in the British Museum (Natural History), London.

This species runs to *Zygina* in Mahmood's (1967) key, and resembles Young's (1952) redefined *Zygina* in the venation of the fore and hind wings, the shape of the vertex, style and Y-shaped connective, and the pygofer lobes with an appendage arising internally from the dorsal margin; but not in the shape of the aedeagus and pygofer lobes. Thus, this species has been placed in the genus *Zygina*, which contains several African species also apparently not closely related to the type-species, *Zygina nivea* (Mulsant and Rey), and awaiting a revision.

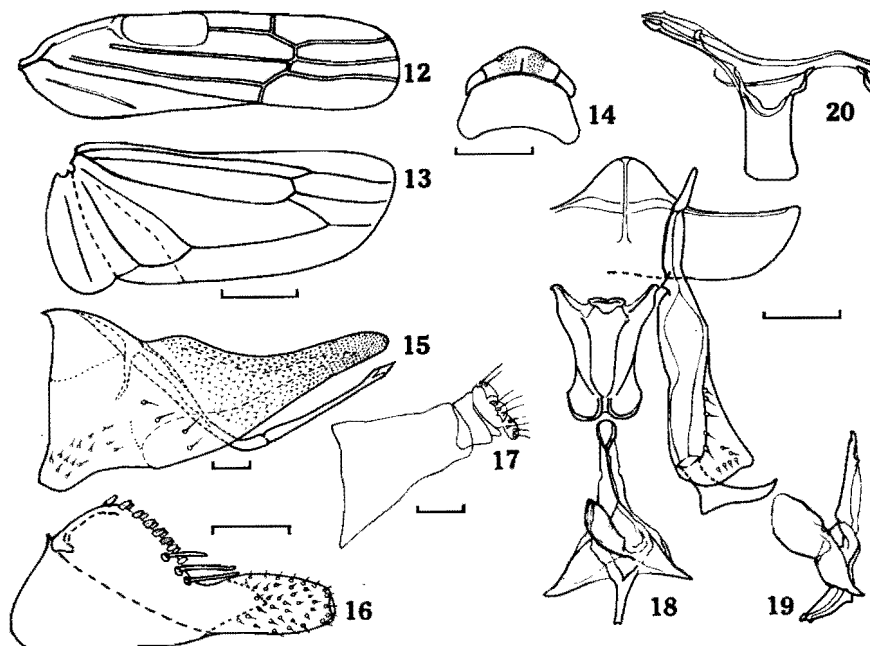
Zygina simaethis Ghauri (1963) from Tchad, *Z. newbyi* Ghauri (1964) from Sudan and *Z. elegia* have similarities in the venation of the fore and hind wings, and, in the males, in the size and shape of the preapical lobe and apical extension of the style. But the male *Z. elegia* can be separated easily from all other Erythroneurini by the elongated pygofer lobe, the long upturned pygofer appendage and the asymmetrical aedeagus; the red markings on the vertex, pronotum and fore wings, when well-developed, is a useful superficial character.

Zygina purpureatincta (Cogan, 1916) **comb. nov.**, figs 12–20

Colour. General body colour pale brown (presumably the colours have faded since Cogan's original description (1916): "dark brown above, tinged with purple, beneath yellowish"). Fore wings pale brown, (Cogan's description (1916) continues "with a distinct purple tinge, translucent, the veins showing as darker brown lines, a pronounced longitudinal purple marking on the outer marking (*sic*) (= margin?) of the middle of the corium").

Size. Head: width including eyes, 0,71; vertex; length, 0,14, width at base, 0,43. Thorax: pronotum; length, 0,34, maximum width, 0,78. Length of fore wing, 2,30; length of hind wing, 1,88. Length of body (head to tip of folded wings), 3,24.

Structure. Head slightly produced, with apex broadly angled in dorsal aspect; medial length of vertex about equal to one-third distance between eyes, and approximately $1\frac{1}{4}$ times length next eyes; broadly angled to face, with latter wider than long; ocelli present. Pronotum with "two furrows running from middle behind the eyes, to a little beyond the posterior half" (described by Cogan (1916), but no longer visible); scutellum a little longer than pronotum.



Figs 12-20. *Zygina purpureatincta* (Cogan). Lectotype male. 12. Fore wing. 13. Hind wing. 14. Head and pronotum, dorsal view. 15. Pygofer lobe, left lateral view. 16. Subgenital plate, ventrolateral view. 17. Anal tube, left lateral view. 18. Connective, aedeagus and style, dorsal view. 19. Aedeagus, right lateral view. 20. Abdominal apodeme. Scale lines under 12-13 and 14 represent 0,5 mm; those under 15, 17, 20 and over 16, 18-19, 0,1 mm.

Apodemes of second abdominal sternite of male moderately small, widely separated. Anal tube very long.

Male genitalia: pygofer lobe greatly elongated (0,9 mm), curving dorsally and posteriorly; distal half tapering, with margins incurved; outer wall with numerous small spines; basal half with small setae ventrally; a single long slender appendage arising internally from the dorsal margin and reaching almost to distal tip of pygofer lobe. Subgenital plate moderately small (0,37 mm long), broad; lateral margins incurved; basal half of dorsal margin with double row of small stout setae and three large setae; distal third with outer surface thickly covered with small spines. Style with small setae distally on outer margin; preapical lobe large with small setae clustered near distal margin; apical extension broad, forming a large, simple, slightly curved, foot-like structure. Connective as in fig. 18, lateral margins well-sclerotised, gently curved dorsally to articulate with styles. Aedeagus small; preatrium long, giving rise distally to pair of ventrally directed triangular processes; dorsally bearing a broad process; shaft short and directed dorsad.

MATERIAL EXAMINED. ♂-Syntype, "*Typhlocyba purpeatincta* (sic). Type. Capetown, C.G.H., Table Mt., 17.iii.1900", in collection of the South African Museum, Cape Town. This specimen is here designated as lectotype.

This species is close to *Z. viridis* spec. nov., and, in the key to Erythroneurini by Mahmood (1967), both species run to the genus *Thaia* Ghauri if it is assumed that the style apex has a single apical extension and the connective is V-shaped; however both species are obviously unrelated to the two *Thaia* species (Ghauri, 1962). These two characteristics have been badly defined, and various interpretations are possible; by assuming that the style has a single apical extension and that the connective is Y-shaped or nearly so, these species run to the genus *Zygina*. Both species appear to be only distantly related to the type-species, *Zygina nivea* (Mulsant and Rey), and to be closest to some of the Ethiopian species already placed in *Zygina*, such as *Z. lubiae* (China) which has similarities in the venation of the wings, the shape of the vertex, and the style with asymmetrical apex (though hook-shaped in *Z. lubiae*) (China, 1931); however they should probably not be congeneric.

Both *Z. purpureatincta* and *Z. viridis* have the vertex broad with fore and hind margins nearly parallel; fore wings with all apical cells elongate (the second and third with subparallel and slightly curved sides); style with strongly asymmetrical apical appendage; preapical lobe bearing setae; connective approximately Y-shaped; aedeagus with long preatrium, simple, paired processes and short, simple shaft; and subgenital plates with broadened basal half; the only taxonomic features in common with *Z. elegia* are the dorsal origin of the pygofer appendage, and the arrangement of setae on the subgenital plates.

Z. purpureatincta has very unusual male genitalia, with pygofer lobes, pygofer appendage and anal tube greatly elongated, which allow it to be separated easily from any other known species of typhlocybid leaf-hopper.

***Zygina viridis* spec. nov., figs 21–33**

Colour. General body colour green, with abdomen hyaline and fore wings hyaline with white tinge.

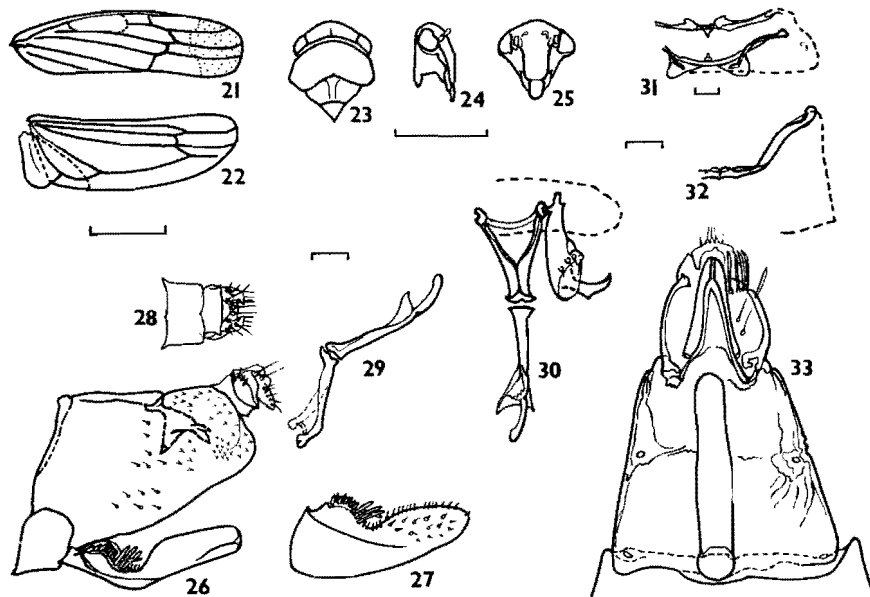
Size. Head: width including eyes, 0,78 (0,73); vertex; length, 0,14 (0,15), width at base, 0,40 (0,36–0,47). Thorax: pronotum; length, 0,33 (0,32), maximum width, 0,88 (0,85); scutellum; length, 0,61 (0,59), width at base, 0,65 (0,62). Length of fore wing, 3,03 (2,96); length of hind wing, 2,71 (2,66–2,75). Length of body (head to tip of folded wings), 3,71 (3,60).

Structure. Head slightly produced, with apex broadly angled in dorsal aspect, medial length of vertex approximately $1\frac{1}{2}$ times length next eyes, broadly angled to face, with latter longer than wide; ocellular area $1\frac{1}{4}$ times width of antennal fossa; ocelli lacking.

Apodemes of second abdominal sternite of male poorly developed, very short, just reaching anterior margin of third sternite.

Male genitalia: pygofer lobe broadly rounded posteriorly, medial area with numerous microsetae and discal area with numerous microspines; short, stout appendage arising internally from mid-dorsal margin consisting of a bifid, ventroposteriorly directed process and a deltoid basal process directed ventrad. Subgenital plate short; lateral margin strongly curved basally; dorsal margin with double row of stout microsetae, terminated by three longer setae; distal half with numerous microsetae. Style very short; with few microsetae distally on outer margin, preapical lobe broad, and apical extension short, ending in a large, slightly curved foot-like structure. Connective flat, approxi-

mately Y-shaped, with strong, curved lateral margins. Aedeagus with preatrium long, slender, bearing a flat deltoid process distally; shaft laterally flattened and curved dorsad.



Figs 21-33. *Zyginia viridis* spec. nov. 21-31. Holotype male. 21. Fore wing. 22. Hind wing. 23. Head, pronotum and scutellum, dorsal view. 24. Head and pronotum, right lateral view. 25. Face. 26. Pygofer lobe, valve, subgenital plate and anal tube, left lateral view. 27. Sub-genital plate, ventrolateral view. 28. Anal tube, dorsal view. 29. Connective and aedeagus, left lateral view. 30. Aedeagus, ventrolateral view, connective and style, dorsal view. 31. Abdominal apodemes, dorsal view. 32-33. Paratype female. 32. Abdominal apodemes, dorsal view. 33. Genitalia, ventral view. Scale lines under 21-22 and 23-25 represent 1,0 mm; those over 26-29, 30 and 32 and under 31, 0,1 mm.

Female abdomen: genitalia small and poorly developed, segments VI and VII strongly sclerotised, united, with a finger-like medial appendage (length 6 times width) arising from anterior margin of sternite VI and nearly reaching posterior margin of sternite VII.

MATERIAL EXAMINED. ♂-Holotype, "Cape Town, South Africa, Botanical Gardens, 8.v.1968, on leaves of castor plant (*Ricinus communis* L.), coll. B. M. Gerard", in the British Museum (Natural History), London. 2 ♀-paratypes, same data as holotype.

This species is close to *Z. purpureatincta* (Cogan), but not *Z. elegia* (Cogan), as already discussed. It is a green species, when alive, an unusual colour for members of the Erythroneurini. The females collected have a peculiar fusion of the 6th and 7th abdominal segments and a finger-like appendage ventrally; these may be abnormalities caused by parasitism, but as the three female specimens collected are identical, and

as the male genitalia has the styles and subgenital plates unusually small (which indicates that the female genitalia might also be unusual), it can be cautiously suggested that the normally developed females are as figured.

In addition to the smallness and characteristic shape of the style and subgenital plate, male *Ž. viridis* can be recognised by the shape of the pygofer appendage and the aedeagus.

***Kybos theroni* spec. nov., figs 34–44**

Colour. General body colour green, with abdomen hyaline and fore wings hyaline with pale green tinge; most of distal half of antennal flagellum red.

Size. Head: width including eyes, 0,62 (0,63–0,76); vertex; length, 0,20 (0,21), width at base, 0,31 (0,33). Thorax: pronotum; length, 0,29 (0,32), maximum width, 0,62–0,74 (0,64–0,73); scutellum; length, 0,33 (0,31–0,43) width at base, 0,45 (0,40–0,52). Length of fore wing, 2,34–2,51 (2,44–2,71); length of hind wing, 2,06–2,30 (2,12–2,45). Length of body (head to tip of folded wings), 2,91–3,04 (3,01–3,30).

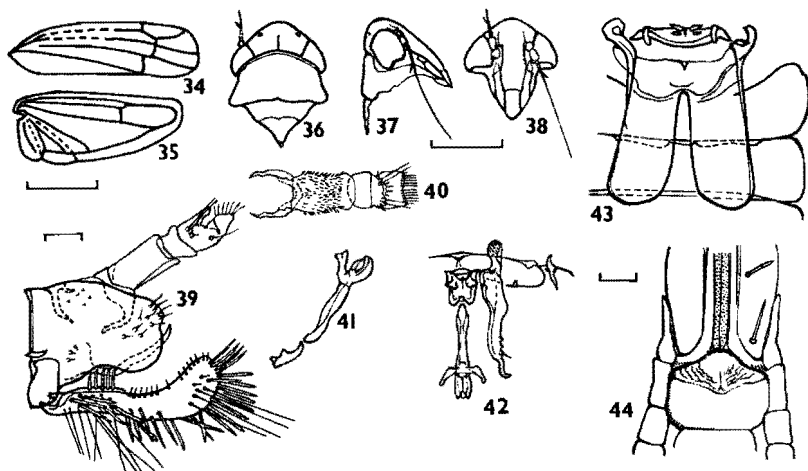
Structure. Head slightly produced, with apex broadly angled in dorsal aspect, medial length of vertex approximately $1\frac{1}{4}$ times length next eyes, broadly angled to face, with latter longer than wide; ocellular area $1\frac{1}{4}$ times width of antennal fossa; each ocellus located approximately equidistant between the eyes and medial line of vertex; antenna very long (0,79–0,96 mm), approximately equal to combined medial length of head, pronotum and scutellum.

Apodemes of second abdominal sternite of male elongate, each apodeme slightly more than twice as long as wide and extending to posterior region of sternite IV. Anal tube long; basal appendages long and thin.

Male genitalia: pygofer lobe broadly rounded posteriorly; medial and discal areas with fine setae in small clusters; long, slender appendage arising internally from the midventral margin; dorsal margin bearing pair of strongly developed dorsomedial apodemes with unequal arms. Subgenital plates elongate, exceeding apex of pygofer lobe; not fused; upturned and broadly curved; basal third of dorsal margin with row of 5 stout setae; basal and apical areas with numerous slender setae (including some exceeding 0,2 mm in length); apical half of dorsal margin with discontinuous row of microsetae; approximately two dozen macrosetae in double row on ventral surface and apical margin. Style elongate, with preapical lobe narrow; mesal margin grooved apically; microseta (absent in some paratypes) situated on outer margin proximad to grooves. Connective approximately rectangular, slightly longer than broad; with paired dorsal processes on lateral margins, and pair of posteriorly-directed broad deltoid ventral plates. Aedeagus with long, slender preatrium giving rise distally to pair of dorsal processes directed laterally then curving posteriorly; shaft short and broad.

MATERIAL EXAMINED. ♂-Holotype, "Cape Town, South Africa, Botanical Gardens, 5.ii.1970, on leaves of dahlia (*Dahlia variabilis* Desf.), coll. J. G. Theron", in the British Museum (Natural History), London.

Paratypes: 1 ♂, 8.v.1968, coll. B. M. Gerard; 2 ♂ 1 ♀, 5.ii.1970, coll. J. G. Theron, 1 ♂ 5 ♀, 16.iii.1970, coll. J. G. Theron; other data as for holotype. 1 ♂ 1 ♀, 5.ii.1970, on castor plant (*Ricinus communis* L.), coll. J. G. Theron; other data as for holotype. 2 ♂ 3 ♀-paratypes dep. in the South African Museum, Cape Town, remainder in the British Museum (Natural History), London.



Figs 34-44. *Kybos theroni* spec. nov. 34-43. Holotype male. 34. Fore wing. 35. Hind wing. 36. Head, pronotum and scutellum, dorsal view. 37. Same, right lateral view. 38. Face. 39. Pygofer lobe, valve, subgenital plate and anal tube, left lateral view. 40. Anal tube, dorsal view. 41. Connective and aedeagus, left lateral view. 42. Connective, aedeagus and style, dorsal view. 43. Abdominal apodemes, dorsal view. 44. Paratype female. Genitalia, ventral view. Scale line under 34-35 represents 1,0 mm; that under 36-38, 0,5 mm; those over 39-42, 44 and under 43, 0,1 mm.

In the key by Ghauri (1967), this species runs to the genus *Amrasca* Ghauri if key character 1b is followed (because the anterior and posterior margins of the vertex are not parallel), though it obviously has no close relationship with any of the four *Amrasca* species; if key character 1a is followed, it runs to the genus *Kybos* Fieber. This species has been placed in the genus *Kybos* though it differs from the type-species, *Kybos smaragdula* (Fallén), in the shape of vertex, venation of the fore wings and the arrangement of setal groups on the subgenital plates. A thorough revision of Ethiopian genera related to *Empoasca* is needed before deciding whether *K. theroni* should be placed in a new genus, or whether the genus *Kybos* should be redefined.

Female *Kybos theroni* differ from female *Empoasca protea* Cogan and *E. heliophila* Cogan in the greater length of their wings as well as in the venation of fore and hind wings. The males of the Ethiopian species *Empoasca dolichi* Paoli (Paoli, 1930), *E. distinguenda* Paoli (Paoli, 1932) and *Kybos theroni* have similarities in the shape of the preapical lobe of the style, grooving on the mesal margin and the presence of setae on the outer margin at the apex of the style; the presence of many microsetae on the basal segment of the anal tube, which also bears a pair of basal appendages; the shape of the midventral pygofer appendage; and the shape of the subgenital plates. However, differences, probably of importance at generic level, exist between these three species. The males of these species can be separated by the shape of the anal tube appendages, and the distribution and length of the setae on the sub-genital plates.

This species is named in honour of Dr J. G. Theron, who has redescribed ten of Cogan's species of leafhopper (Theron, 1970), and who collected the holotype and many paratypes of this species for me.

ACKNOWLEDGEMENTS

I thank Dr J. G. Theron, University of Stellenbosch, Stellenbosch, for collecting additional material for me, Dr A. J. Hesse, the South African Museum, Cape Town, for supplying Cogan's remaining type material, and the Keeper and Dr W. J. Knight, the Department of Entomology, British Museum (Natural History), London, for allowing me to study other leafhoppers in their care.

REFERENCES

- CHINA, W. E. 1931. A new species of *Erythroneura* (Homoptera, Jassoidea) injurious to French Beans (*Phaseolus vulgaris*) in the Sudan. *Bull. ent. Res.* **22**: 53-54.
- COGAN, E. S. 1916. Homopterous Studies. Part I. Contribution towards our knowledge of the Homoptera of South Africa. *Ohio J. Sci.* **16**: 161-208.
- GHAURI, M. S. K. 1962. A new typhlocybid genus and species (Cicadelloidea: Homoptera) feeding on rice in Thailand. *Ann. Mag. nat. Hist.* (13) **5**: 253-256.
- 1963. A new citrus leaf-hopper (Homoptera: Cicadelloidea) from Tchad. *Ann. Mag. nat. Hist.* (13) **6**: 391-393.
- 1964. A new species of *Zygina* Fieber (1866a) (Homoptera: Cicadelloidea) attacking cotton in Sudan. *Ann. Mag. nat. Hist.* (13) **7**: 397-399.
- 1967. New mango leaf-hoppers from the Oriental and Austro-oriental regions (Homoptera: Cicadelloidea). *Proc. R. ent. Soc. Lond.* (B) **36**: 159-166.
- MAHMOOD, S. H. 1967. A study of the typhlocybinae genera of the Oriental Region. *Pacif. Insects Monog.* **12**: 1-52.
- METCALF, Z. P. 1968. General Catalogue of the Hemiptera. Fascicle VI Cicadelloidea Part 17 Cicadellidae. Agric. Res. Service, U.S. Agric. Dep., Washington, 1513 pp.
- NAUDÉ, T. J. 1926. Cicadellidae of South Africa. A taxonomic and faunistic study. *Entomology Mem. Dep. Agric. Un. S. Afr.* **4**: 1-106.
- PAOLI, G. 1930. Caratteri diagnostici delle Emposca e descrizione di nuove specie. *Proc. Soc. tosc. Sci. nat.* **39**: 64-75.
- 1932. Specie nuove di Emposca (Hemiptera-Omoptera) e appunti di corologia. *Memorie Soc. ent. ital.* **11**: 109-22.
- THERON, J. G. 1970. Redescription of ten of Cogan's species of South African Cicadelloidea (Hemiptera). *J. ent. Soc. sth. Afr.* **33**: 303-323.
- YOUNG, D. A. 1952. A reclassification of Western Hemisphere Typhlocybinae (Homoptera, Cicadellidae). *Kans. Univ. Sci. Bull.* **35**: 3-217.

Manuscript received 28 December 1971.